

## Using GRACE data to validate simulated groundwater

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The land surface component of the hydrological cycle has a major role on the earth climate through the exchanges of water and energy at the soil-vegetation-atmosphere interface. This has motivated the numerical weather prediction and climate modelling communities to develop more realistic Land Surface Models. Each development of the model always needs to be validated. However, the validation steps are not usually trivial because of lack of in situ observations at the larger scale. Successfully launched in mid-March 2002, the Gravity Recovery and Climate Experiment (GRACE) mission is a powerful tool to validate the water storage variations simulated in the LSMs. This paper shows that the routing scheme recently integrated in the Organising Carbon and Hydrology in Dynamic Ecosystems (ORCHIDEE) LSM, developed at the Institute of Pierre Simon Laplace France, has an important positive effect on the simulated land water storage. Without the routing scheme, the predicted amplitudes over the large tropical rivers basins are significantly smaller than the GRACE data. Taking into account the groundwater given by the routing scheme, the predicted land water storage values are quite comparable to the observations. The simulated groundwater reservoirs contribute of about half of seasonal variations of water storage over some large basins such as the Amazon, the Congo, the Ganges, the Mekong. In the absence of in situ observations at global scale, this study provides an interesting alternative of using remote-sensed data to validate new concepts for representing the storage of water on the continents.